Operating and Maintenance Instructions with Dismounting and Mounting Instructions

Eccentric Screw Pumps Series ADP, ADBP

Operating data of the pump according to order data sheet

Job No.: Pump Ident No:

Machine No.: Pump type:

1. General

1.1 Application and range of utilization

The eccentric screw pumps are self-priming, rotary positive-displacement pumps for handling and dosing liquid to highly viscous, neutral or aggressive, pure or abrasive, gaseous fluids or fluids which tend to froth, even with fibre and solids contents.

ATTENTION **The range of utilization is to be taken from the order data sheet.**

1.2 Performance data

The exact performance data applying to the pump are to be taken from the order data sheet and are engraved on the type plate.

1.3 Warranty

Our liability for shortcomings in the supply is laid down in our delivery conditions. No liability will be undertaken for any damages caused by non-compliance with the operating instructions and service conditions.
If at any later date the operating conditions happen to change (e.g. different fluid pumped, speed, viscosity, temperature or pressure conditions), it must be checked by us from case to case and confirmed, if necessary, whether the pump is suited for these purposes. In case no special agreements were made, pumps supplied by us may, during the warranty period, be opened or varied only by us or our authorized contractual service stations; otherwise, our liability for any defects will cease.

1.4 Testing

Prior to leaving our factory, all pumps are subjected to a leakage and performance test. Only properly operating pumps leave the factory achieving the performances assured by us. Thus, compliance with the following operating instructions ensures proper operation.

2. Safety

These operating instructions contain basic hints to be observed in case of installation, operation and maintenance. Therefore, prior to mounting and commissioning, these operating instructions must by all means be read by the fitter as well as the pertinent expert personnel/customer and must always be available at the place of installation of the machine/plant.
Not only are the general safety hints listed under this main item Safety to be observed, but also the special safety hints, such as for private use added to the other main items.

2.1 Marking of hints in the operating instructions

The safety hints contained in these operating instructions which, in case of non-compliance, may cause danger to the personnel, are particularly marked with the general danger symbol

Safety sign
according to DIN 4844-W9

in case of warning against electric voltage with

Safety sign
accoridng to DIN 4844-W8

For safety hints, non-compliance of which may cause dangers to the machine and its functions, the word

ATTENTION

is added.

Hints directly attached to the machine such as

- Directional marker
- Sign for fluid connections

must by all means be observed and maintained in completely legible condition.

2.2 Personnel qualification and personnel training

The personnel for operation, maintenance, inspection and mounting must have the corresponding qualification for these operations. Range of liability, competence and the supervision of the personnel must be exactly controlled by the customer. If the personnel do not have the required knowledge, same must be trained and instructed. If required, this may be effected by the manufacturer/supplier on behalf of the machine owner. In addition, it must be ensured by the customer that the contents of the operating instructions are fully understood by the personnel.

2.3 Dangers in case of non-compliance with the safety hints

Non-compliance with the safety hints may result in both, danger to persons as well as environment and machine. Non-compliance with the safety hints may lead to the loss of any claims for damages.

In detail, non-compliance may, **for example,** entail the following dangers:

- Failure of important functions of the machine/plant
- Failure of specified methods for maintenance and servicing
- Danger to persons by electrical, mechanical and chemical influences
- Danger to the environment by leakage of dangerous substances

2.4 Responsible working

The safety hints mentioned in these operating instructions, the current national rules for the prevention of accidents as well as any internal working, operating and safety regulations of the customer must be observed.

2.5 Safety hints for the customer/operator

- If hot or cold machine parts lead to dangers, these parts must be protected against accidental contact at the site.
- Protection against accidental contact for moving parts (e.g. coupling) must not be removed when the machine is in operation.
- Leakages (e.g. of the shaft seal) of dangerous materials to be handled (e.g. explosive, toxic, hot) must be discharged so as not to result in danger to persons and the environment. Legal stipulations are to be observed.
- Dangers by electrical energy are to be excluded (for details with regard hereto, please refer e.g. to the regulations of the VDE and the local energy supply associations).

2.6 Safety hints for maintenance, inspection and mounting operations

The owner shall see to it that all maintenance, inspecttion and mounting operations are performed by authorized and qualified expert personnel who have sufficiently informed themselves by thoroughly studying the operating instructions.
Basically, operations at the machine must be performed during standstill only. The mode of operation for stopping the machine described in the operating instructtions must by all means be observed.
Pumps or aggregates handling noxious fluids must be decontaminated.
Immediately upon completion of the operations, all safety and protective devices must be mounted and made operational again.
Prior to restarting, the items listed in Section „6.1 Preparation for Start-Up“ are to be observed.

2.7 Arbitrary reconstruction and spare parts production

Reconstruction of or changes to the machine are only admissible after consulation with the manufacturer. Original spare parts and accessories authorized by the manufacturer serve safety purposes. The use of other parts may cancel the liability for the consequences resulting therefrom.

2.8 Inadmissible modes of operation

The operating safety of the machine supplied is only ensured with due application according to Section 1 – General – of the operating instructions. The limit values given in the data sheet must by no means be exceeded.

3. Transportation and intermediate storage

3.1 Packing

The symbols applied to the packing must be observed. During transportation and storage, suction and outlet side and auxiliary connections of the pump must be closed with plugs. During installation of the pump aggregate, the plugs must be removed.

3.2 Transportation

Due to their weight, eccentric screw pumps and all pump aggregates are transported to the place of instalation by means of a lifting appliances.
When transporting the pumps by means of a crane, the sling ropes must be placed safely around the suction casing.
In case of complete pump aggregates, a rope must be additionally fixed to the drive motor.
The sling ropes must be placed around the pump and/or the pump aggregate so that when being lifted, they are in exact balance.

Crane installation and the sling ropes must be sufficiently sized. The sling ropes must not be fixed to the suspension eyes of the motor.

3.3 Preservation and storage of eccentric screw pumps

Please refer to our document VM 2102 GB

4. Description

4.1 Structural design

Self-priming, three-stage eccentric screw pump. Rotor and stator are the conveying elements. Via the drive shaft and/or pump shaft and coupling rod, the drive torque is transmitted onto the rotor.

4.1.1 Bearing and lubrication

Coupling rod with liquid-tight encapsulated pin joints on both sides. Lubrication by joint grease. For series ADP, the bearing of the drive/pump shaft is in the bearing bracket by life-time lubricated groove ball bearings and for series ADBP, in the reinforced bearings of the drive.

4.1.2 Shaft seal

By uncooled stuffing box or by uncooled, maintenance-free, unbalanced single-acting mechanical seal.

4.1.3 Dimensions/branch position/flanges

The dimensions of the pump and/or pump aggregate, the branch position and companion dimensions are to be taken form the tables of dimensions.

4.2 Mode of operation

Self-priming, rotary, positive-displacement pump, the conveying elements of which are the rotating eccentric screw (rotor) and the fixed stator. Both meet in the cross-section at two points each which, regarded over the length of the conveying elements, form two sealing lines. The contents of the tight chambers formed as the rotor rotates are shifted axially and completely continuoulsy form the suction to the outlet side of the pump. There is no turbulence despite the rotor rotation. The constant chamber volume excludes squeezing thus ensuring an extremely gentle low-pulsation delivery.

4.3 Aggregate construction

4.3.1 Drive

By non-explosion-proof or explosion-proof electric motors, geared motors or variable-speed geared motors.

4.3.2 Base plate

The pumps of horizontal installation are, as a rule, mounted with the drive on a common base plate. Base plates are provided of steel.

5. Installation/mounting

5.1 Installation

The pumps may be installed horizontally or vertically with the drive upwards.
For exact data on pump and aggregate dimensions, please refer to our tables of dimensions.

5.2 Base plate

The base plate must be secured to the foundation free from tension.

5.3 Space required for maintenance and servicing

ATTENTION The pump must be accessible form all sides allowing necessary visual inspecttions to be performed.
For maintenance and service operations, sufficient space must be provided, especially for the replacement of the conveying elements. Stator and rotor dismounting dimensions are given in the pump and/or pump aggregate table of dimensions. In addition, see to it that all pipelines can be mounted and dismounted without any difficulties.

5.4 Laying of pipelines

5.4.1 Nominal bores

The nominal bores of the suction and delivery lines should match the nominal diameters of the pump connections. The manufacturer should be consulted in the event of considerable deviations, particularly on the suction side.
The pipelines must be connected without tension and sealing.

5.4.2 Cleaning of pipelines prior to attachment

Prior to mounting the pump, the suction-side pipelines, slides and valves must by all means be flushed and/or cleaned.
Items left over from assembly operations, e.g. bolts, nuts, weld spatter, pieces of steel etc. damage the internal components of the pump. Our guarantee is invalidated if damage is caused by items of this type.

5.5 Safety and control facilities

5.5.1 Pressure and vacuum gauges

A pressure and vacuum gauge must be connected to the delivery and suction lines.

5.5.2 Safety mechanism in the delivery line

If a shut-off mechanism is fitted in the delivery line or if there is a possibility of the delivery line becoming blocked, a safety mechanism must be provided. E.g.: by-pass line with built-in relief valve, bursting disc, motor protection switch etc.

Eccentric screw pumps are positive-displacement pumps and can theoretically generate an infinitely high pressure.
With the delivery line closed, e.g. by blocking or by inadvertent closing of a valve, the pressure generated by the pump may reach a multiple of the admissible pressure of the plant. This may, for example, lead to the bursting of lines which must be absolutely avoided especially with dangerous products being handled. Thus, appropriate safety devices must also be installed in the plant (e.g. pressure switches).

5.6 Electric connections

Connection of the power supply cables of the drive motor must be effected by an electrical expert according to the switching diagram of the motor manufacturer. For these purposes, the current VDE regulations and the regulations of the local energy supply association are to be observed.
Danger by electrical energy must be excluded.

6. Starting/Stopping

6.1 Preparation for starting

6.1.1 Filling the pump with fluid

ATTENTION Do not allow the pump to run when dry! For initial start-up and after prolonged standstills, the pump must be filled with fluid.
Even a few revolutions without fluid may damage the stator. Therefore, prior to starting, the suction casing must be filled with water or fluid to be handled to lubricate stator and rotor. After a long shutdown period, i.e. when it is to be expected that the remaining fluid in the pump has evaporated or after a repair, the filling process must be repeated.
After filling, the pump operates self-priming. Venting is unnecessary as a mixture of liquid and gas can be handled without any trouble.

6.1.2 Break-away of the pump

When starting up for the first time or after a long shutdown period, ensure that the pump can be turned easily by the drive motor. If this is not readily possible, e.g. due to a high degree of adhesion between rotor and stator when brand-new, movement can be assisted by using a suitable tool in the parallel key area of the drive shaft.

ATTENTION The drive shafts must not be damaged when doing so.

6.1.3 Control of the direction of rotation

The normal direction of rotation of the pump is anticlockwise, looking from the drive unit towards the drive shaft. In this case, the suction connection is on the packing gland side relieving the shaft seal of any pressure. In special cases, e.g. when drawing from a vacuum or when handling materials which cannot tolerate any gas inclusions, the pump rotates clockwise with suction and delivery sides reversed.

ATTENTION The direction of rotation of the pump must correspond to the directional marker „n“ in the pump type plate. Wrong direction of rotation may result in damages to the pump. For the control of the direction of rotation, the motor on/off switch is to be touched only briefly.

6.2 Starting

6.2.1 Start-up
All shut-off mechanisms on the suction and delivery sides must be opened before starting up.

6.2.2 Drive
Switch motor in.

ATTENTION Consider product-specific particularities of the drive. Please refer to the operating instructions of the drive manufacturer.

6.2.3 Checking the delivery valves
After the drive has reached its operating speed, the pump inlet and outlet pressure must be checked via the vacuum and pressure gauges.
The motor must not be overloaded. The power consumption can be checked by means of an ammeter. In this connection, temperature and viscosity of the fluid to be handled must be checked. The values read must be checked against the order data sheet and/or acceptance report.

6.2.4 Protection against dry running
If no further fluid to be pumped arrives at the suction side, the thermal energy generated in the conveying elements of the eccentric screw pump due to dry friction and churning work is no more sufficiently dissipated as a result of which the stator elastomer is thermally destroyed already after a short period of time. For the conveying elements to be protected, various dry running protection systems are available, adapted to the respective operating conditions (please contact factory).

6.3 Stopping

6.3.1 Shut-down
Switch motor off.

6.3.2 Measures in case of a longer shut-down period
If a longer shut-down period is projected and there is a danger of frost, the pump must be drained. Thereafter, the pump must be preserved (please refer to our document VM 2102 GB).

7. Maintenance/Servicing

7.1 Maintenance
For maintenance and service operations, the details listed under Section 2. Safety are to be observed. Regular control and maintenance of the pump and drive will extend the service life.

7.1.1 General control

1. Do not allow the pump to run when dry.
2. The drive motor must not be overloaded.
3. Check suction and delivery lines for tightness.
4. During operation, an installed stuffing box must be slightly dripping.
   An installed mechanical seal must not have any heavy leakage.
5. Observe pressure and temperature monitoring instruments, and check against the order data sheet and/or acceptance report.

7.1.2 Maintenance of components

7.1.2.1 Joints of the coupling rod
The universal joints are lubricated with grease „Tribol 5000 with TGOA“ from Tribol Lubricants GmbH, Mönchengladbach, Germany; when used in the food industry, with grease „Nontrop PLBDR“ from Klüber, Munich.

ATTENTION Other lubricants were not tested by us and can, therefore, not be recommended by us!

The universal joints are lubricated for life.

7.1.2.2 Shaft seal
Shaft sealing is either via a stuffing box packing or mechanical seal.

- **Stuffing box packing**

Increased leakages, if any, at the stuffing box packing during the first few hours of operation normally disappear automatically during the running-in period.
If necessary, slightly tighten hexagon nuts (202) at the packing gland (203).
Please note that the stuffing box packing must be slightly leaking. This causes dissipation of the frictional heat generated at the sealing surface.

If the leakage losses increase excessively, and if leakage cannot even be reduced by repeated slight tightening of the hexagon nuts (202), the packing rings have lost their elasticity of shape and must be replaced.

- **Dismounting the old packing rings and cleaning the shaft sealing housing**
  Following the pressure relief of the pump and after removal of the packing gland, the old packing rings can be removed. A packing puller with flexible shaft serves as tool. Thereafter, the stuffing box chamber and the pump shaft and/or drive shaft must be carefully cleaned within the area of the packing rings. Worn pump shafts and/or drive shafts must be replaced (refer to the Dismounting and Mounting Instructions).

- **Mounting the packing rings**

ATTENTION In principle, only such packing rings are to be installed which correspond to the required operating conditions of the pump.
For the dimensions and necessary quantity of the pre-pressed packing rings and ring blanks and/or cutting lengths, please refer to Section 7.1.2.5 below.
For blanks, we recommend the straight vertical cut to the shaft. For a gap-free parallel positioning of the cut ends to be achieved when closing the packing ring, the blank angle should be approx. 20° to both cut ends (refer to Fig. 1).

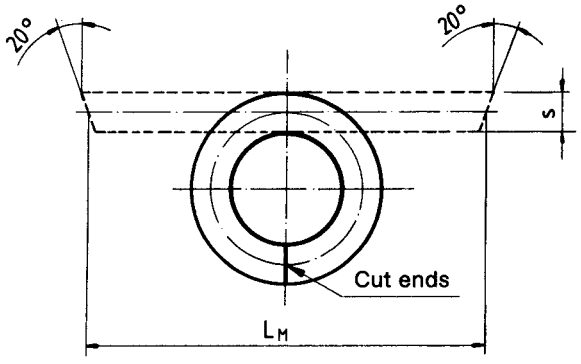


Figure 1: Blank of packing rings

Pre-pressed packing rings or ring blanks must be carefully untwisted axially and radially to such a degree only that they can just be pushed over the shaft. Bending-up the rings may result in damage by breaking.
During installation in the packing chamber, the packing rings must be carefully re-bent into angular shape. During this process, the kerfs must be set off by 90°. By means of the packing gland, each ring must be individually pushed into the stuffing box chamber with the cut ends foremost.

ATTENTION Pointed items must never be used for these purposes as there is a danger of shaft damage and deformation of the packing materials.

- **Commissioning of the stuffing box after re-packing**
  Prior to commissioning, the stuffing box packing must be only slightly tightened. During pump starting, 50 to 200 drops in a minute are admissible as seepage quantity.
  During the starting process of approx. 30 minutes, a minimum leakage of 2 to 20 drops in a minute must be set by gradually and evenly tightening the packing gland (203) by means of the hexagon nuts (202).
  ATTENTION During this process, the stuffing box temperature must not rise abnormally. Approx. 20 to 60°C above the temperature of the fluid pumped are admissible. In case of a sudden temperature rise, the packing gland must be immediately slackened and the running-in procedure repeated.
  Personal injuries and environmental damages resulting from the leakage of dangerous materials must be excluded.

- **Mechanical seal**

  Single-acting, non-balanced mechanical seals are employed. The mechanical seal is maintenance-free. In case of heavy leakage due to wear, the mechanical seal must be replaced (refer to Dismounting and Mounting Instructions).
  ATTENTION As dry running of the mechanical seal must be avoided, the pump may be started in a filled condition only.

- **Rotary shaft seal**

  Rotary shaft seals with automatically retensioning sealing lips are used. The rotary shaft seal is maintenance-free. In case of leaks as a result of worn rotary shaft seals, the seal must be replaced (see dismantling and assembly instructions).

7.1.2.3 V-belt drive
Please refer to our maintenance instructions for V-belt drive with tensioning device VM 706.0001 GB – Ident No. 133586.

7.1.2.4 Drive motors and (control gears)
Please refer to the manufacturers' operating and maintenance instructions.

7.1.2.5 Packing ring dimensions (to Section 7.1.2.2)

Number of packing rings	4
Dimensions of packing rings for ring blanks	Ø 30/20 x 5
Dimensions of packing rings as blank L_M x S	84 x 5

7.2 Servicing (Dismounting and Mounting Instructions)

General
On request, trained service engineers will be at your disposal for mountings and repairs.
In case of repairs performed by the customer's own personnel or our trained mechanics, it must be ensured that the pump is completely empty and clean.

This applies in particular to pumps which, in case of repair, are sent to our factory or to one of our contractual repair shops.
In protection of our staff and for reasons of environmental protection, we have to refuse to accept for repair any pumps filled with fluid pumped. Otherwise, we will have to charge the customer/operator with the costs for an ecologically acceptable waste disposal.
In case of repair of pumps operated with dangerous materials ① and/or fluids harmful to the environment, the customer/operator must advise hereof his own and/or our local mounting personnel or, in case of return, our factory and/or contractual service shop of his own accord. In such a case, evidence of the fluid handled, e.g. in the form of a DIN safety data sheet will have to be presented to us when requesting a service engineer.

① **Dangerous materials are:**

- Toxic substances
- Substances detrimental to health
- Caustic substances
- Irritants
- Explosive materials
- Fire-promoting, highly, easily and normally inflammable materials
- Carcinogenic substances
- Foetopathic substances
- Genes-changing substances
- Substances which are dangerous to human beings in any other way

When working locally, the customer's own and/or our mounting personnel must be referred to dangers which may be caused in connection with repairs.

The most important dismounting and mounting operations are described in these instructions. The mounting steps described in the individual sections must be consistently observed.

7.2.1 Dismounting the eccentric screw pump

Prior to commencing the dismounting, the following operations must be performed:

- Disconnect power supply cable from the motor. Motor must not be capable of being started.
- All shut-off mechanisms in the supply and delivery lines must be closed.
- Dismount supply and delivery lines.
- Loosen screws at the pump feet and screw out.
- Drain the fluid to be pumped from the suction casing. **Note:** Use collecting tank.

Screw stator 402 out of the suction casing 505.

Pull stator 402 from rotor 401. If difficulty is experienced, rotate stator 402 at the same time. In order to do so, secure pump shaft 125 and/or drive shaft 118.

Remove suction casing screws 606 and/or motor fastening screws.

Remove nut 202 and/or screw 230 and screw protection 231.

Pull suction casing 505 over the rotor 401 ensuring that the precision-machined rotor is not damaged when doing so.

① Eject drive-type pin 123.

① Pull pump shaft 125 from drive shaft.

Push out coupling rod pins 301.

Pull rotor 401 from the coupling rod 307.

② Loosen hexagon socket with cup point 237 and pull spacer sleeve 222 from the pump shaft 125 and/or drive shaft 118.

Dismount drive-side joint.

Withdraw O-ring 313 from coupling rod 307.

② Pull mechanical seal 219 and mechanical seal cover 215 from the pump shaft 125 and/or drive shaft 118.

③ Pull packing gland 203 from the pump shaft 125 and/or drive shaft 118.

③ Remove stud bolt 201 and stuffing box packing 207 from the suction casing 505.

① Pull flinger ring 114 from the drive shaft 118.

① Loosen circlip 127 and pull out of the groove. Remove parallel key 101.

① Push drive shaft 118 with all mounted parts out of the bearing housing 110.

① Loosen retaining circlip 121 and pull out of the groove.

① Pull axial bearing 104 from the drive shaft 118.

① Press spacer sleeve 102 and radial bearing 193 out of the bearing housing 110.

④ Press rotary shaft seal 232 out of suction housing 505.

7.2.2 Mounting the eccentric screw pump

After careful cleaning, the pump or its individual parts are assembled accordingly in reverse order. Particular attention must be paid to the following points:

① **ATTENTION** Coat the whole surface of the drive shaft prior to mounting the pump shaft (125) with Klüber paste 40 MR 401 from Klüber, Munich.
Before pushing in coupling rod 307, fill rotor head 401 and/or drive shaft head 118 or pump shaft head 125 with grease „Tribol 5000 with TGOA“ from Tribol Lubricants, Mönchengladbach (or similar) (grease quantities 2 g per universal joint). When used in the food industry: „Nontrop PLBDR“ or similar from Klüber, Munich. Push in coupling rod pin 301 and lock by one punch mark on both sides.

Before fiting, coat rubber bellows of the mechanical seal 219 as well as stator 402 and rotor 401 with a lubricant (silicon oil, polydiol, soft soap or the like).

ATTENTION Do not use ordinary oil!

④ Press rotary shaft seal 232, with the metal housing facing the axial face seal cover 215, into the cleaned seat of suction housing 505.

Prior to screwing into the suction casing 505, provide stator thread with sealing compound (e.g. Teflon tape).

③ Insert parallel key 101 in the drive shaft 118 and lock by two punch marks on the front face.

① Not applicable to bearing B
② Not applicable to model P01
③ Not applicable to bearing E
④ Not applicable to model P01, G00

7.3 Spare parts/replacement parts

In the following sectional drawings with parts list, all pumps mentioned are represented with the various shaft seal types.
The parts marked in the parts list can be provided as spare parts/replacement parts.

Recommended spare parts/replacement parts:
R = large repair kit
r = small repair kit

For reasons of operating safety, only original spare parts supplied by us must be kept on stock and installed. In this connection, we refer to the statements made under Section 2.7 above.

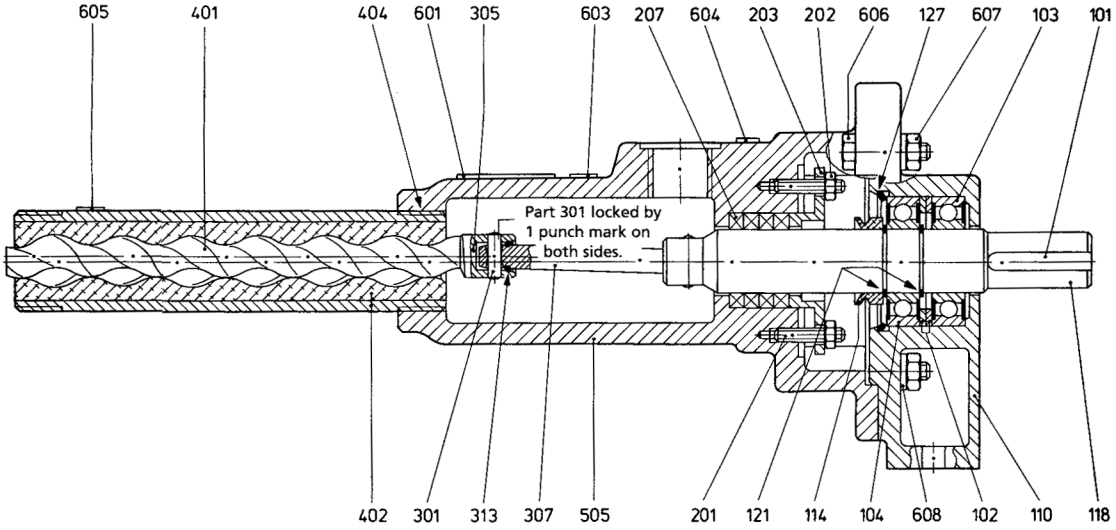
For spare parts/replacement parts orders, the following must be stated:
Machine numbers
Abbreviation of pump
Part number
Denomination and part quantity
or Ident No. and quantity

Note: The machine number and the abbreviation of the pump are engraved on the type plate.
Note: the Ident No. and quantity can be seen from the attached separate spare parts list.

Part No.	Denomination		Qty.
101	Parallel key		1
102	Spacer sleeve		2
103	Radial bearing	R	1
104	Axial bearing	R	1
110	Bearing housing		1
114	Flinger ring		1
118	Drive shaft	R	1
121	Retaining circlip		2
123	Drive-type pin		1
125	Pump shaft	R	1
127	Retaining circlip		1
141	Lubricating paste	R, r	1
201	Stud bolt		2
202	Hexagon nut		2
203	Packing gland		1
207	Stuffing box packing	R, r	1
215	Mechanical seal cover		1
219	Mechanical seal	R	1
222	Spacer sleeve		1
230	Hexagon screw		2
231	Spring ring		2
232	Shaft seal	R, r	1
237	Hexagon socket with cup point		1
301	Coupling rod pin	R, r	2
305	Joint grease	R, r	0
307	Coupling rod	R, r	1
313	O-ring	R, r	2
401	Rotor	R, r	1
402	Stator	R, r	1
404	Stator sealing	R, r	0
505	Suction casing		1
601	Type plate		1
603	Information plate – Commissioning		1
604	Information plate – Suction		1
605	Information plate – Delivery		1
606	Hexagon screw		4
607	Hexagon nut		4
608	Fan-type lock washer		4

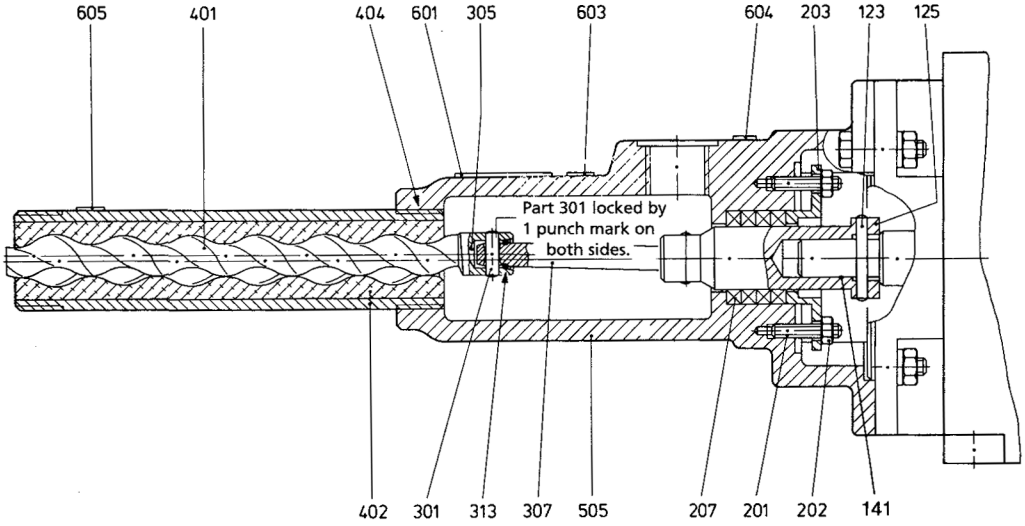
7.4 Sectional drawing and spare parts list for Series ADP, ADBP

Sectional drawing for Series ADP

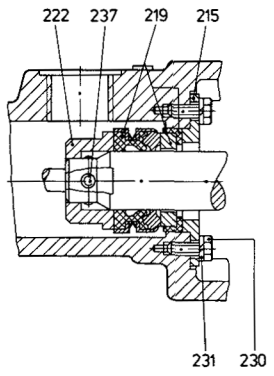


Bearing: **B** (lubricated for life)
Shaft seal: **P01** Stuffing box packing of standard design.

Sectional drawing for Series+ ADBP

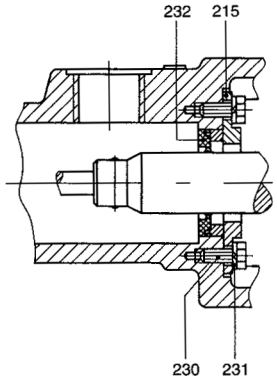


Bearing: **E** (external bearing in the drive aggregate)
Shaft seal: **P01** Stuffing box packing of standard design.



Series ADP, ADBP

Shaft seal: **G00** Mechanical seal, single-acting, non-balanced, direction-independent.



Seires ADP, ADBP

Shaft seal: **POX** Rotary shaft seal dependent on direction of rotation.

8. Operating troubles – Causes and remedial action

No.	Operating troubles										Causes and remedial action
	Pump does not start	Pump does not prime	Capa-city is not reached	Pressure head is not reached	Irregular pump delivery	Pump oper-ates noisily	Pump seized or stopped delivery	Motor over-heating	Stator wears prema-turely	Shaft seal leaky	ALLWEILER **eccentric screw pumps operate without trouble at all times if they are used according to the operating conditions con-tained in our order confirmation and if the operation manual is observed.**
	a	b	c	d	e	f	g	h	i	k	
1	•							•			Pressure between stator/rotor still too great (new condition) or stator too tight. Rotate pump by hand using an auxiliary tool.
2		•									Check sense of rotation against arrow on pump, in case of wrong direction of rotation, change motor poles.
3		•	•		•	•	•				Check suction line and shaft seal for leaks.
4		•	•		•	•					Check suction head – increase suction line cross section, if necessary – fit larger filters – open suction valve fully.
5		•	•		•						Check viscosity of fluid pumped.
6	•		•					•			Check pump speed – check speed and power consumption of drive motor – check voltage and frequency.
7			•		•						Avoid air locks in the fluid to be pumped.
8	•		•				•	•	•		Check delivery head – open slide valve in delivery line fully, remove blockage from delivery line.
9		•	•		•		•		•		Pump runs completely or partly dry. Check whether fluid pumped on suction side is suffi-cient.
10		•	•								Increase speed for liquid media and high suction volume.
11		•			•	•					Reduce speed with viscous media – danger of cavitaiton.
12						•					Check end clearance of coupling rod pins, coupling rod bush perhaps fitted incorrectly (with universal joint encapsulated liquid-tight)
13	•	•	•				•		•		Check for foreign bodies in pump. Dismantle pump, remove foregin bodies, replace defective components.
14		•	•	•			•				Stator and rotor worn, dismantle pump, replace defective components.
15		•	•			•	•				Joint parts worn: Disassemble pump, replace defective parts.
16		•	•				•		•		Suction line completely or partly blocked.
17	•	•					•	•	•		Check temperature of fluid pumped – stator expansion too great – stator seized on rotor – stator perhaps burnt.
18	•	•	•				•		•		Solids content too high and/or particle size too large – reduce speed: Fit strainer with suitable mesh size upstream of pump.
19	•	•							•	•	Solids settle and harden when pump shut dwon - flush pump immediately, dismantle and clean, if necessary.
20	•	•					•		•	•	Medium hardens after dropping below a certain Temperature limit – heat pump.
21						•		•			Align coupling correctly.

Subject to technical alterations.

ALLWEILER
A Member of the
COLFAX PUMP GROUP
ALLWEILER AG . Werk Bottrop
Postfact 200123 . 46223 Bottrop
Kirchhellener Ring 77-79 . 46244 Bottrop
Germany
Tel. +49 (0)2045 966-60
Fax +49 (0)2045 966-679
E-mail: service-ge@ allweiler.de
Internet: http://www.allweiler.com
Railway station: 45127 Essen

VM 752.0001 GB/11.99 – Ident-No. 124 200